July 4, 1944. T. JANISZEWSKI 2,353,039

BASIC JOINTS AND BARS FOR BUILDING STRUCTURES

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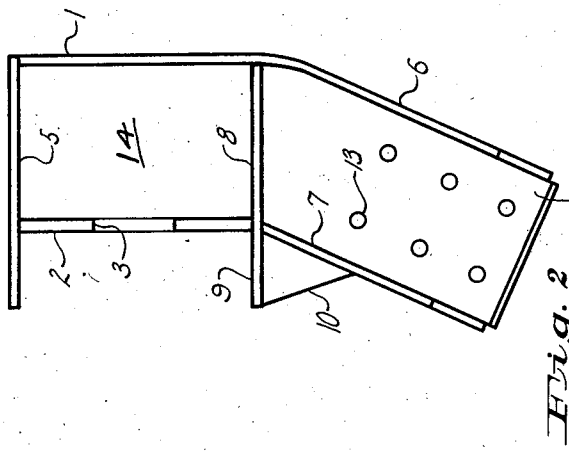


Fig. 2

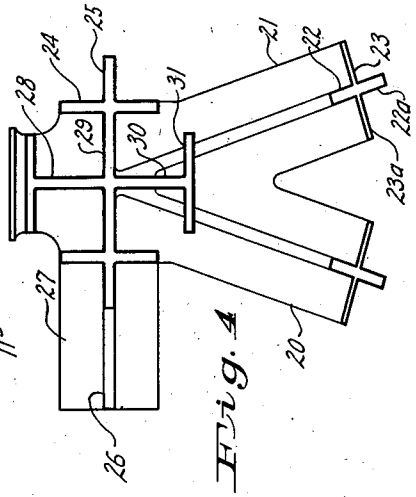


Fig. 4

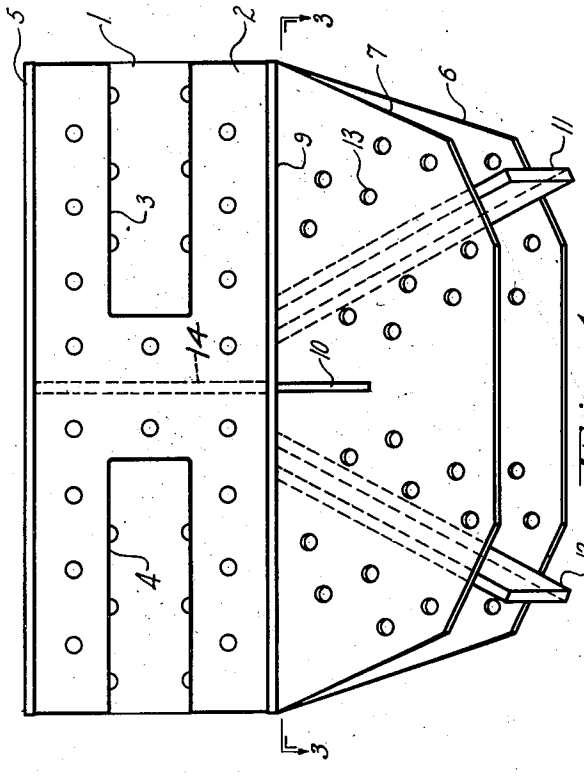


Fig. 1

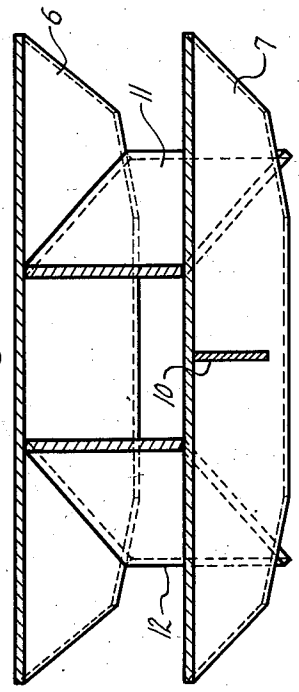


Fig. 3

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BASIC JOINTS AND BARS FOR BUILDING STRUCTURES

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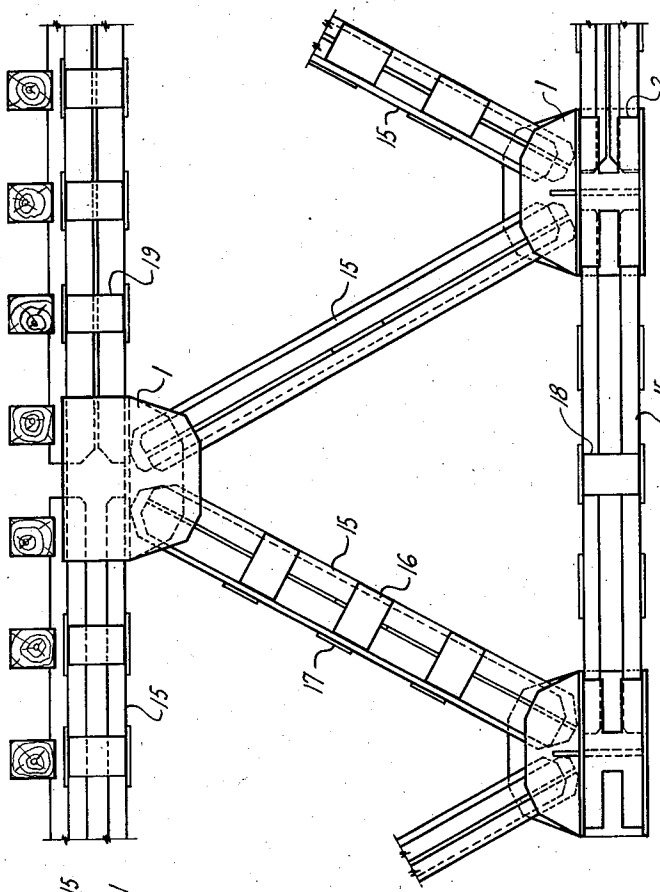


Fig. 6

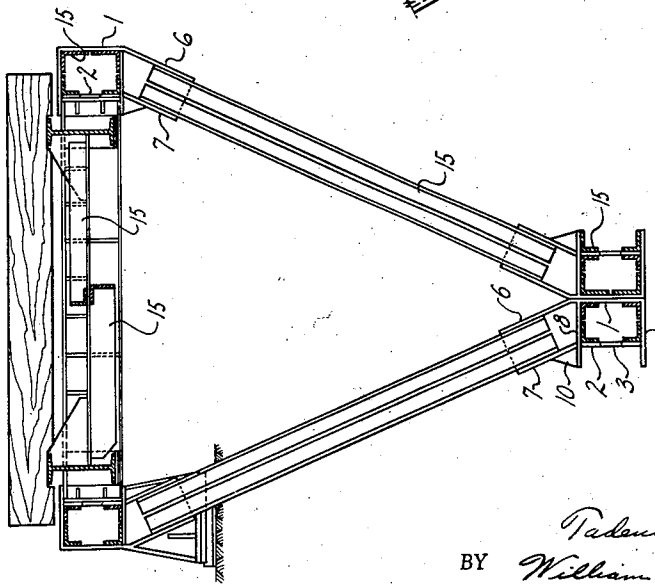


Fig. 5

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BASIC JOINTS AND BARS FOR BUILDING STRUCTURES

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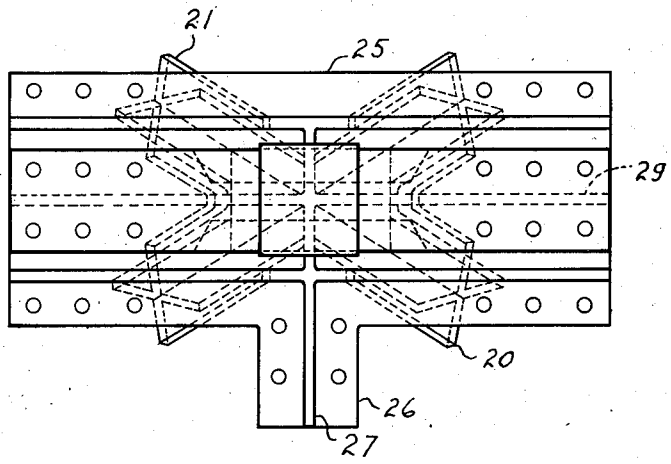


Fig. 8

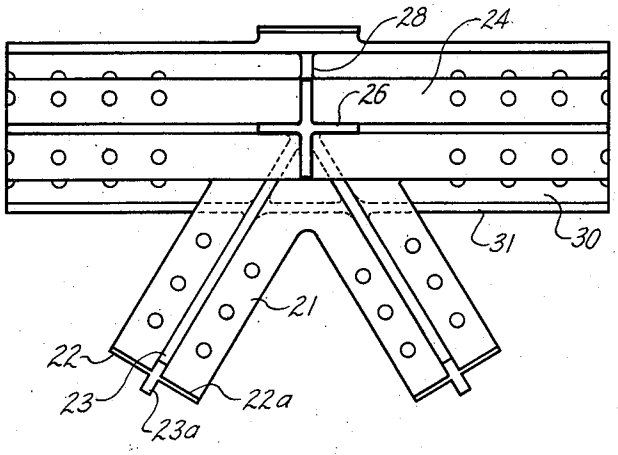


Fig. 7

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Patented July 4, 1944 2,353,039

UNITED STATES PATENT OFFICE

2,353,039

BASIC JOINT AND BAR FOR BUILDING STRUCTURES

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Application January 26, 1942, Serial No. 428,144

6 Claims. (Cl. 189—36)

This invention relates to new and useful improvements in joints for basic structural steel members, and it is among the objects thereof to provide such a joint in the form of a casting or as a fabricated sheet metal member to especially adapt it for use in the assembly of structural steel elements to form bridges, towers, buildings or other structural forms and supports.

I am well aware that structural steel members have been designed with special joints to adapt them for assembly of standard or basic structural steel bars or shapes, such as angles, channels, I-beams and the like, as is one of the objects of this invention.

The present invention, in addition, provides for the attachment of such structural members on two or more of their faces or sides to lend rigidity and to effect uniform distribution of stresses in the assembly.

The invention further contemplates the design of a joint having its structural bar anchorages so arranged as to produce a predetermined directional disposition to the connecting strut or beam as well as to provide for securely anchoring the members at their point of assembly in the joint.

The invention will become more apparent from a consideration of the accompanying drawings constituting a part hereof in which like reference characters designate like parts, and in which:

Fig. 1 is a front elevational view of a fabricated sheet metal joint embodying the principles of this invention;

Fig. 2 a side elevational view thereof;

Fig. 3 a cross-sectional view taken on the line 3—3, Fig. 1;

Fig. 4 a side elevational view of a modified form of joint constituting an integral casting,

Fig. 5 a cross-sectional view of a railroad bridge embodying the joint shown in Figs. 1 to 3;

Fig. 6 a side elevational view of a fragmentary portion of the bridge illustrating the adaptation of the joint to a structural form;

Fig. 7 a front elevational view of the cast joint of Fig. 4; and

Fig. 8 a top plan view thereof.

With reference to Figs. 1 to 3 of the drawings, the joint comprises a pair of side plates 1 and 2, the latter having cut-out windows 3 and 4 for accessibility to the interior of the joint, the side plates 1 and 2 being joined to a top plate 5 by welding. The side plate 1 is provided with an extension 6 which is diagonally disposed as shown in Fig. 2 and the side plate 2 is provided with an extension plate 7 which is secured in parallel relation to the extension 6 by welding the same to a web plate 8 having an extension 9 with a web 10 to reinforce the structure and to supply rigidity to the extension 9.

Web plates 11 and 12, Fig. 1, are disposed between the extension 6 and angle plate 7 and welded thereto at a predetermined angle. The walls of the joint and the web plates are perforated as shown at 13 for receiving rivets, pins or bolts, or the structures may be joined by welding.

As appears from Fig. 1, a transverse web 14 is disposed centrally of the longitudinal dimensions of the plates 1 and 2 to give rigidity and strength to the joint.

The utility of the joint of Figs. 1 to 3 is more readily demonstrated in connection with Figs. 5 to 6 of the drawings wherein the portions of a railroad bridge are shown.

Angle bars 15, having both legs contacting the walls of the joint, as shown in Fig. 5, are employed as chords and are secured to the joint by rivets or bolts or in any other suitable manner on both the engaging leg faces. Similarly, such angle bars are employed in the joints at the bottom of the structure which shows the joints arranged in back-to-back relation to form a part of the supporting lower chord.

Angle bars employed as webs connect the upper joints with the bottom or base joints, as shown, with the legs of the bars, in engagement with the walls 6 and 7 of the joint, to again obtain a contacting or seating of the bar on two walls of the joint to which they are secured.

Thus, for example, the diagonal disposition of the webs 11 and 12 correspond to the angle of the diagonals 15 in Fig. 5 and the angle bars are seated on the webs 11 and 12 with one leg engaging either the wall 6 or 7 of the joint.

As shown in Fig. 5, the upper joints have their angular portions inwardly disposed while the supporting base joints have their angular portions outwardly disposed in alignment with the upper joint brackets with the diagonals 15 disposed therebetween and joined thereto at the respective ends of the bars.

In the view of Fig. 6, the diagonal bars or struts 15 are reinforced by tie-plates 16 and 17, and similarly the chord members or bars are reinforced by plates 18 and 19.

Obviously, the extension portions of the joints may be straight instead of angular and spaced in vertical relation to form rectangular shapes hav-

ing the facility to engage the structural members in the same manner as illustrated in connection with the structure shown in Figs. 5 and 6 of the drawings.

Also the dimensions of the joint are standardized to permit interchange of the structural angle bars and arrangement of the bars in different structural shapes.

In the modification illustrated by Fig. 4, the seating faces of the structural bars are integrally formed by casting and provide for the engagement of the angle bars on both legs and for fastening the same on two walls of the joint.

Thus, for example, the cross-shaped extensions 20 and 21 of the joint of Fig. 4 will accommodate four angle bars, although a lesser number may be used. If four are employed, a leg of the bars will seat against the face 22 and the face 23 of the joint or the faces 22*a* and 23*a* of the joint, and in like manner any of the bars, such as when employed in a horizontal plane, may be seated and secured to the faces 24 and 25 or transverse bars may be seated and secured to the faces 26 and 27 of the joint. Bars may also be seated and secured to any of the vertical or horizontal faces, as for example 28 and 29 of the joint or 30 and 31, and the joint of Fig. 4 or a modification thereof may be utilized in a similar manner to that shown in Figs. 5 and 6, and for other structural forms.

It is to be noted that the cast joint of Fig. 4 may be substituted for the two joints in the bottom of the structure in Fig. 5. Other modification of joint shapes to effect directional distribution of the truss elements may, obviously, be employed.

While the invention has been illustrated as embodied in a bridge structure to demonstrate the practical adaptation of the same, it will be obvious that it is generally useable in structural steel work, as in buildings, towers and the like.

By the use of the two basic elements, the joint and supporting bars, any combination of the two elements may be employed to produce a structure of desired cross-section. It may be especially useful for constructing temporary or permanent military bridges in that by means of the standardized shapes of the bars and connecting bolts, it will be unnecessary to have special spare members in stock to replace damaged ones under war conditions. A minimum number of spare parts consisting of the basic joint member and angle bar will suffice to maintain such bridges in proper repair.

The joints may be riveted, welded or cast and the bars may be constructed from rolled profile or by welding.

It is evident from the inclination of the mounting faces of the joint that the chords and webs may be of the same length. Thus, for example, with reference to Fig. 6, if the angle bars 15 of the webs and chords were decreased to half of the present size, the joints and truss elements would retain their same angular relationship.

Although several embodiments of the invention have been herein illustrated and described it will be evident to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

I claim:

1. A joint for building structures having angular mounting faces for connection with chord and web truss members consisting of structural angle bars, said faces engaging and joining with two legs of each of the connecting angle bars.

2. A joint for building structures having integral connecting faces for joining structural angle bars by contact with both legs of said bars, some of said connecting faces being diagonally or transversely disposed with respect to other connecting faces to constitute the angle bars chord and web members of a truss.

3. A bridge structure comprising a plurality of horizontally and vertically spaced joints of identical construction, each joint having connecting faces for receiving horizontally and diagonally disposed basic angle bars and each having an extension angularly disposed from a vertical centerline, the extension of the upper joints inclining inward and the extension of the lower joints inclining outward at an angle to form a substantially V-shaped structure in cross-section in which all of the connecting truss members are of the same length.

4. In a building structure, a truss comprising the combination with a plurality of joints of a plurality of structural angle bars, said joints having angular mounting faces for making connections with two legs each of the structural angle bars of the chord and web truss members, said mounting faces being of such angularity that all of the connecting truss members may be of the same length.

5. A joint for building structures comprising a pair of side plates having angularly disposed portions forming extensions of said side plates, one of said side plates having windows for access to the interior of the joint, a top or cover plate for said side plates, a web plate between said side plates and the extensions thereof, a web plate between said side plates transversely of said first-named web plate and diagonally disposed web plates between the extensions of said side plates, said side plates, extensions and web plates coacting to engage and connect two faces or legs of each of a plurality of structural angle bars.

6. A joint for building structures as described in the next preceding claim in which the dimensions of the joint are standardized to permit interchange of the structural angle bars and arrangement of the bars in different structural shapes.

TADEUSZ JANISZEWSKI.